



Saving Lives and Property Through Improved Interoperability

***Status of Hong Kong Police Force
Combined Voice/Data Real Time Video
Communications System Procurement***

Final

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Note: The PSWN Program is dedicated to improving safety by facilitating the implementation of interoperable communications among public safety organizations. To fully support this initiative, the PSWN Program is monitoring wireless data standards activities in the United States and abroad.

Introduction

The Hong Kong Police Force (HKPF) released a far-reaching Request for Information (RFI) for a new, combined, voice/data and real-time video communications system. HKPF intends this new system to support the communications needs for both mobile and pedestrian officers by means of a third-generation integrated voice and data command and control communications (C3) system. Third generation (3G) technology is defined as technology including the near-term enhancements expected for wireless data, specifically greater bandwidth, improved compression rates, and in-building coverage. Developed with open standards, the HKPF system will be scalable to support the Force's interoperability requirements today and in the future.

Background

More than 28,000 sworn officers and 5,000 civilians work to provide safety and security services to the Hong Kong region. With 16,457 people per square mile, Hong Kong is one of the most densely populated areas in the world. For policing purposes, Hong Kong is divided into the following regions: Hong Kong Island, Kowloon East and Kowloon West, New Territories North and New Territories South, and Marine (including the outlying islands). These regions are further segmented into 23 districts and again subdivided into divisions. Regional Command and Control Centers (RCCC) support police operations for each region. These RCCCs, similar to traditional dispatch centers, serve multiple functions, including emergency call processing and dispatching assignments for patrol units. Each region, district, and division sends and receives radio transmission on at least one primary radio channel employing "all-informed" (i.e., simultaneous transmissions relayed to all operating radios) broadcast transmission protocols. The current system for foot patrol officers and emergency response vehicles is a 10-year old, 23-site Motorola 450 megahertz (MHz) simulcast/ multicast conventional analog system that is nearing the end of its life cycle. A 4-year old, 31-site, 450 MHz, wide-area, Motorola SmartZone analog system supports the traffic division.

To meet the present and future demands of this sizeable public safety organization, the police force is requesting that the responding vendor have the resources, personnel, and sufficient global perspective to accomplish the design, construction, and implementation of the desired system. The C3 system functional requirements include digital technology, 95 percent coverage (including outlying islands), 99.9 percent availability, and seamless hand-off, and the system must meet all operational requirements as defined by the HKPF. The HKPF has a wide range of missions and user requirements. For example, the marine division of the HKPF has implemented a trunked digital land mobile radio network that must fully complement and integrate with the proposed integrated communications system (ICS). The marine division, which is responsible for all of Hong Kong's open waters, has a challenging list of requirements. This division requires "environment-proof" mobile subscriber units, roaming, and integrated voice and data.

The current technology system upgrades are sponsored by several initiatives including the Hong Kong Government's directive to improve productivity and make more effective use of technology. Also driving the procurement of a new system are HKPF operational initiatives that support the ability to quickly receive and process information by improving internal command and control systems. As a result, improved interoperability opportunities will enhance the HKPF's capacity to communicate effectively with the customer and the public, as well as to collaborate more efficiently with other outside agencies.

C3 System Description

The C3 is a large-scale communications system intended to support a significant user base. To help ensure that the stringent HKPF requirements are met, the development of the system is keyed to five sub-systems:

- **Integrated Communications System (ICS).** The wireless communications system used by the HKPF
- **Emergency Call Taking System (ECTS).** A component of the C3 used to process emergency telephone calls
- **Computer Aided Dispatch System (CAD).** A component of the C3 used to manage calls for service, internal messages, and dispatching of field units
- **Mobile Computing System (MOB).** A component of the C3 used to support data communications requirements
- **Interface Design, System Integration, and Project Delivery Services (SER).** The category of services used to define the system, project goals, and integration methods.

The following sections highlight the TETRA standard used as the foundation of the C3 system, along with several of the unique requirements associated with the noted sub-systems.

Terrestrial Trunked Radio

Developed in 1994, terrestrial trunked radio (TETRA) is an open digital trunked radio standard commonly used in Europe. This technology offers easy-to-use, two-way conversation, Internet access, and image transmission. TETRA-based products incorporate encryption features, an important consideration for public safety users. As a result, this technology will likely serve as the foundation for the C3 system. However, because TETRA is not yet mature, HKPF has reported that vendors are generally submitting proprietary system designs in response to the RFI. Further, due to the limited number of existing systems, benchmarking the costs for a TETRA system is difficult. To mitigate these risks, HKPF representatives are monitoring the standards development process. Note that the inclusion of TETRA in North America as part of the Project 25 (P25) suite of standards, the Association of Public-Safety Officials' (APCO) digital technology standard for public safety in the United States, is still pending. This technology may be included in the later phases of P25.

C3 Sub-Systems

ICS. Several components comprise the ICS. These components support unique public safety requirements and present new interagency and external interoperability opportunities.

The radio terminal component of the ICS identifies specifications for handheld and mobile radios, as well as ancillary equipment. The radio units must meet the traditional public safety specifications such as push-to-talk (PTT), emergency buttons, trunked communications, and scan features, and also support data, voice, video, and messaging services in one device. In addition to these, several other, relatively unique, requirements are also listed, including—

- Unit weight less than 300 grams or 10 ounces
- Air interface or end-to-end encryption
- Dual-band operations using 380–400 MHz and 410–430 MHz bands¹
- Ten hours of battery life with an operational duty cycle of 5 percent Tx (i.e., PTT), 35 percent Rx (i.e., microphone and display), and 60 percent standby
- Voice recording in local memory of the device
- Use of Wireless Applications Protocol
- Global Positioning System/Automatic Vehicle Location (GPS/AVL) transmitting capabilities for handheld portable radios and mobiles
- Robust messaging capabilities.

The mobile radio infrastructure (MRI) requirements are also of interest. Planning for future expansion, HKPF has requested an extra 30 percent capacity. The infrastructure must also accommodate slow motion video for approximately 1,500 radio terminals at a rate of 30 minutes per event, totaling 15 events per day. The system must then be capable of delivering these video signals to the RCCC. This feature should increase interagency interoperability by allowing command staff personnel to visually assess and direct the incident response remotely, as it unfolds.

ECTS. This system would provide support to the call-takers of the RCCCs (i.e., dispatch facilities). Serving as an area call center, each RCCC manages approximately 10,000 calls per day. Mirroring the 911 capabilities of the United States, HKPF requires that the ECTS be scalable and capable of interoperability with CAD systems and the ICS. Accomplishing facility interconnectivity through a wide area network, the system must support the regional operations command structure with expansion capabilities encompassing up to six facilities.

CAD System. CAD systems are used to display, maintain, and record calls for service, field unit activity, and support administrative functions for a specific jurisdiction, in real time. The new HKPF CAD system must enhance the efficiency of call-taking functions, provide messaging with multiple external and internal systems, and improve the general dispatch functions through connectivity with ICS and ECTS. To accurately identify callers, incident locations, and real-time geographical positions of police personnel, the new CAD system must also incorporate geographical information system (GIS) and GPS/AVL technology.

MOB. Mobile computing systems are used to improve field unit mission effectiveness by offering constant accessibility to information housed in databases, e-mail, messaging, and Internet services. To support HKPF foot patrol mission, 10,000 handheld computers, (similar to a Palm handheld computer devices) are necessary. The new MOB must incorporate numerous distinct requirements specified in the RFI including—

- AVL
- Bar code scanning
- Data inquiries
- Dispatch terminal connectivity
- Electronic mail images
- Recorded video
- Remote updating of forms
- Recorded voice
- Short data and text messaging
- Slow scan video
- Still images
- Telemetry and remote diagnostics.

SER. This section of the RFI defines the vendor approach to system integration testing and project delivery services, along with the functional, performance, and acceptance testing procedures. The successful vendor must develop the interface designs on a common platform to accommodate the inclusion of fire services and other government agencies.

Implementation Schedule

HKPF will employ a phased implementation strategy to allow adequate time for installation and testing. The phased rollout will leverage the success of initial implementations and work through any deficiencies. Listed in Table 1 is a tentative implementation schedule.

Table 1
Implementation Schedule

TASK	YEAR
Refine User Requirements	2000–04
Evaluate RFIs	2001–03
Establish funding mechanism	2001–06
Contract award	2002–05
Delivery of equipment/installation/training	2002–12
System acceptance and phased rollout	2004–09

Future Development of HKPF C3

HKPF is directing the development of a scalable command and control system with “total interface” capabilities. When viewed separately, each sub-system will be a state-of-the-art example of a public safety resource. When complete, the C3 system is intended to serve the HKPF with very high levels of performance capabilities and a common platform that will allow external agencies to interface easily with HKPF.